Calidris arenaria. Natal, juvenal, compound first non-nuptial, simple first nuptial, simple second non-nuptial, compound adult nuptial.

Cepphus grylle. Natal, juvenal, compound first non-nuptial, compound nuptial, simple adult non-nuptial.

Somateria spectabilis. Natal, juvenal, compound annual, protective (or tutelar.)

Lagopus lagopus. Natal, juvenal, first protective, compound non-nuptial, compound nuptial, adult protective.

Finally I have prepared a table (p. 254) showing by the graphic method, the plumage-cycles of several species, which differ in the number of plumages worn in equal lengths of time. I have represented the average length of time each plumage is worn and the average time of the beginning of the moults but individuals delayed in moult or deficient in vitality will vary much from the average. To-day the average is none too well known even among the commonest species.

ON THE FINDING OF THE BONES OF THE GREAT AUK (*PLAUTUS IMPENNIS*) IN FLORIDA.

BY O. P. HAY.

ABOUT the beginning of the present year the writer received, for identification, from Prof. W. S. Blatchley, State Geologist of Indiana, a small collection of bones which he had made from an Indian shell heap at Ormond, Florida. In looking over this lot of bones, which in general are those of species living to-day in that region, attention was attracted by a strongly flattened bird humerus. It soon became evident that it belonged to some member of the Alcidæ, but was larger than the humerus of any species now living along our coast. On the suggestion of Mr. F. M. Chapman, it was compared with humeri of the Great Auk which had been collected by Prof. F. A. Lucas on Funk Island, and the comparison showed that it agreed with those in every particular. This result

was so surprising that careful inquiry was made of Prof. Blatchley to ascertain the possibility of an intrusion of the bone from some other collection. Assurances were received from that gentleman that he had collected the bone himself at the locality mentioned. Shortly after this an account of the discovery was published in the New York 'Sun'; and this being copied into some of the Florida papers, reached the eyes of Prof. C. H. Hitchcock of Dartmouth College, who was then sojourning at Ormond. He wrote at once making inquiry as to the position of the mound. At the same time I was anxiously looking for some one to continue excavation with a view of finding other bones of this interesting bird; hence the information was at once furnished. Prof. Hitchcock immediately went to work and it was not long before he reported the finding of another humerus. On his return north he stopped at Washington, where he showed the bone to Prof. F. A. Lucas, of the National Museum. Afterward this bone and specimens of the other vertebrates that he had collected at Ormond were turned over to the writer by Prof. Hitchcock for identification.

According to Prof. Blatchley's account, this shell heap is situated on the west bank of the Halifax River, about one mile north of Ormond. The mound was originally 1136 feet long, 213 feet wide where widest, and about ten feet high where highest. A portion of it more than a hundred feet long has been removed for use on the streets of Ormond. The whole is a refuse heap which was made by the Indians, and consists of shells, bones, pottery, etc. The great bulk of the materials is composed of the shells of the little mollusk, *Donax variabilis*, which is very abundant at this locality, the animal of which appears to have been relished by the aborigines. It seems very plain, however, that they were ready to make use of almost any animal, salt water, fresh water, or terrestrial.

Where Prof. Blatchley's excavations were made there are six layers of shells, varying from five inches to three feet in thickness, and five of mold or decaying vegetation, ranging in thickness from two inches to a foot. The surface soil is a foot thick, and in this are growing trees of considerable size. These data give us some idea of the great age of at least the older portions of the mound. The bone of the Great Auk secured by Prof. Blatchley was taken

from the lower two-thirds of the heap. Prof. Hitchcock's excavations were made about twenty feet distant from those of Prof. Blatchley, and the bone which he secured was taken at the very bottom of the heap and beneath eight feet of shells. It many be added that the two humeri belong to the same side, the left.

Much has been written about the distribution of the Great Auk. Its existence on the coast of New England since the time of occupation by white men appears to have been held in some doubt. Prof. F. W. Putnam (Amer. Naturalist, III, 1869, p. 540) informs us that its bones have been found in great numbers in the shell heaps of Massachusetts as far south as Marblehead, Ipswich, and Plum Island. He also presents some evidence to show that it had occurred at Ipswich within perhaps a hundred years. Orton states (Amer. Naturalist, III, p. 539) that Audubon wrote that it had once been plentiful at Nahant. Alfred Newton, who has made a most careful study of the history of the bird says (Ibis, 1861, p. 397) that in comparatively modern times its range extended to Cape Cod. F. P. Hardy in a very interesting paper (Auk, V, 1888, p. 383) quotes a passage from Archer's 'Account of Gosnold's voyage to Cape Cod' showing that among other birds seen there by these voyagers in the spring and summer of 1602 were "penguins," a name in those times often applied to the Great Auk. Hardy concludes that these birds must have been breeding there at that season. This writer also refers to Brereton's 'Account of the voyage of Gosnold to Virginia,' in which it is stated that "penguins" had been observed in that region. At what season they were seen we cannot perhaps determine.

Mr. Symington Grieve, of Edinburgh, who has written various papers on the Great Auk, has, through Prof. Lucas, called my attention to a passage found in Catesby's 'Natural History of Carolina,' published in 1754. The passage is found in the appendix to the second volume, p. xxxvi. Catesby gives there various lists of animals observed by him. One of these lists is entitled "European water-fowls which I have observed to be also inhabitants of America, which tho' they abide the winter in Carolina, most of them return north in the spring to breed." In this list occurs again the name "penguin." Although no considerable importance has hitherto been attached to these statements regard-

ing the great southward range of the Great Auk, statements not corroborated and apparently rather improbable; nevertheless, in the light of the discovery of the bones of this bird in Florida, they seem to gain considerable claim to respect.

That the Great Auk was a permanent resident in Florida is very doubtful. We can hardly argue with respect to the shell heaps of Florida, as Hardy has maintained in the case of the New England heaps, that they were built up during the summer, and that hence the bones are those of auks which were captured at that season. On the other hand, Ormond is a thousand miles distant in a straight line from Cape Cod, and eighteen hundred from Newfoundland; and either of these distances would be a long trip for a wingless bird to make and repeat in half a year, even though his swimming powers were very great.

We shall probably yet learn that the Great Auk was a permanent resident along our coast considerably further south than Cape Cod. For the further elucidation of this subject, search ought to be made in shell heaps all along the coast. Additional information may possibly be obtained from the early writers on the history, civil and natural, of our country.

THE BIRDS OF MARGARITA ISLAND, VENEZUELA.

BY AUSTIN H. CLARK.

THE observations, from which this list is compiled, were taken during a stay on the island of a little over three weeks, from July 2 to July 25, 1901. Specimens were obtained of all the land birds seen except the two Vultures, the Amazonian Parrot, and the South American Nighthawk. Although the conditions in the main agree with those reported by Capt. Wirt Robinson (Proc. U. S. Nat. Mus., Vol. XVIII, pp. 649–685) still there are some important differences, both in the distribution of species, and in the occurrence of forms not found by him.

This season (1901) was exceptionally dry, the rains having to